CLAIMS

1. An apparatus for determining the internal outline of a duct or cavity, comprising:

- light-emitting means (71) suitable for generating a collimated light beam,

- an elongate probe element (51; 51'; 51") suitable for being introduced into the duct and for guiding the collimated beam along a predetermined propagation direction,

- reflector means (52) supported by the probe element (51;, 51'; 51") and suitable for deflecting the collimated beam so as to illuminate the internal wall of the duct, and for deflecting the reflected or diffused light coming from an illuminated point (P) of the internal wall so as to guide it along the probe element (51; 51'; 51"), and

- detection means (76) suitable for receiving an image of the illuminated point (P), which image is correlated with the optical distance of the point from the detection means (76), and for providing a corresponding electrical signal,

characterized in that the reflector means comprise a micro-mirror element (52) articulated to a distal end of the probe element (51; 51'; 51"), the micro-mirror element (52) being orientable so as to deflect the collimated beam in selectively different directions.

2. An apparatus according to Claim 1, further comprising a drive unit (60) for moving the probe element (51; 51'; 51") and a unit (77) for processing the electrical signal, the drive unit and the processing unit cooperating so as to bring about mapping of the internal wall of the duct.

3. An apparatus according to Claim 2, comprising conoscope means (75) interposed between the receiving reflector means (52) and the detection means (76) and suitable for producing, with the light guided by the reflector means, a holographic image with concentric interference fringes which is detectable by the detection means (76), the periods of the fringes being correlated with the optical distance of the illuminated point (P).

4. A probe for an apparatus for determining the internal outline of a duct or cavity, comprising a probe arm element (51; 51'; 51") suitable for being introduced into the duct and supporting at its distal end a micro-mirror element (52) which can deflect a collimated light beam directed along the probe element (51; 51'; 51") so as to illuminate the internal wall of the duct, and which can deflect the reflected or diffused light coming from an illuminated point of the internal wall so as to guide it once more along the probe element (51; 51'; 51") to enable it to be received by detection means (76) of the apparatus, characterized in that the micro-mirror element is articulated to the probe arm element (51; 51'; 51") so as to be orientable in a radial plane relative to the probe arm element (51; 51'; 51").

5. A probe according to Claim 4 in which the micro-mirror element (52) is integral to one end of a lever element (53) articulated to the distal end of the probe arm element (51), the free end of the lever element (53) being operable by a control rod element (55) which is arranged parallel to the probe arm element (51) and can translate along its longitudinal axis.

6. A probe according to Claim 4 in which an electrical current can flow through the micro-mirror element (52) which is disposed between a pair of elongate conductor elements

(65'; 66') suitable for bringing about rotation of the micro-mirror (52) as a result of the electrical currents passing through them.

7. A probe according to Claim 6 in which the elongate conductor elements (65'; 66') and the micro-mirror element (52) are produced by deposition on the probe arm element (51').

8. A probe according to Claim 5 in which the probe arm element (51") is made of ferromagnetic material and is wound up, along its length, by a winding (61") capable of conducting current, the micro-mirror element (52) also being made of ferromagnetic material, so that the rotation of the micro-mirror (52) is brought about by a magnetic field produced by the current passing through the winding (61").

9. A probe according to any one of Claims 5 to 8 in which the probe arm element (51; 51'; 51") can translate along its own longitudinal direction and can rotate about the direction of propagation of the collimated beam.

10. A reflection device for an optical scanning apparatus, comprising a frame element (69'; 62") which can support a substantially flat micro-mirror (52) connected to the frame element (69'; 62") by twisting arms (68'; 63") that are disposed on two opposite sides thereof, and a support element (51'; 51") which is connected rigidly to the frame element (69'; 62") and can support electromagnetic control means (61'; 62'; 67) for bringing about the rotation of the micro-mirror (52) about the twisting arms (68'; 63"), characterized in that the micro-mirror is formed by a self-supporting film of metallic material.

11. A device according to Claim 10 in which the frame element (69'; 62") is connected to the support element (51'; 51") at one end thereof.

12. A device according to Claim 10 or Claim 11, in which the electromagnetic control means comprise a conductive track (67') disposed on the support element (51') and connected to the micro-mirror (52) by means of the twisting arms (68'), and a pair of conductive control tracks (61'; 62') disposed on the support element (51') and forming respective transverse portions (65'; 66') that are disposed on opposite sides of the micro-mirror (52) with respect to the axis of rotation defined by the twisting arms (68') so as to bring about the rotation of the micro-mirror as a result of electrical currents passing through the micro-mirror (52) and through the transverse portions (65'; 66') of the control tracks (61'; 62').

13. A device according to Claim 10 or Claim 11, in which the electromagnetic control means comprise a conductive winding (61") wound around the support element (51"), the micro-mirror being made of ferromagnetic material, so that the rotation of the micro-mirror (52) is brought about by a magnetic field produced by a current flowing through the winding (61").

14. A method of determining the internal impression of the auditory canal, characterized in that an apparatus according to any one of Claims 1 to 3 is used.

15. A method for the manufacture of internal hearing prostheses, characterized in that it comprises the following steps:

- determination of an internal impression of the auditory canal by means of an apparatus according to any one of Claims 1 to 3 in a manner such as to produce a three-dimensional computer representation, and

- machine production of a piece of hearing prosthesis, under the control of a computer using the data relating to the three-dimensional representation.